WILKINSON) BARKER) KNAUER) LLP

2300 N STREET, NW
SUITE 700
WASHINGTON, DC 20037
TEL 202.783.4141
FAX 202.783.5851
www.wbklaw.com
ROBERT D. PRIMOSCH
202.383.3362
rprimosch@wbklaw.com

September 26, 2002

VIA ELECTRONIC MAIL

Marlene H. Dortch
Secretary
Federal Communications Commission
445 Twelfth Street, S.W.
Room TW-A325
Washington, D.C. 20554

>   Re: *RM-10403*
>   *NOTICE OF EX PARTE COMMUNICATION*

Dear Ms. Dortch:

        Pursuant to Section 1.1206(a)(1) of the Commission's Rules, we are writing to report that on September 25, 2002, representatives of WaveRider Communications Inc. ("WaveRider") and undersigned counsel met with Kyle Dixon, Deputy Chief, Mass Media Bureau, with respect to the proposals put forth by Progeny LMS, LLC in the above-referenced proceeding. The WaveRider representatives in attendance were Bruce Sinclair, President and Chief Executive Officer, and Jim Chinnick, Vice-President, Engineering. WaveRider's representatives discussed the growing use of the 902-928 MHz band for license-exempt broadband service, and how adoption of Progeny's proposals (including any elimination or rollback of the "safe harbor" provisions in Section 90.361 of the Commission's Rules) would thwart the ongoing deployment of that service. The attached materials were included in WaveRider's presentation.

WILKINSON) BARKER) KNAUER) LLP

Should there be any questions concerning this matter, please contact the undersigned.

Very truly yours,

/s/

Robert D. Primosch
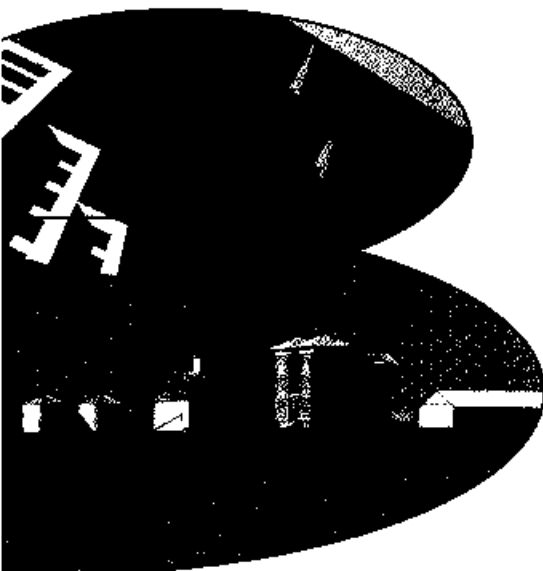Counsel for WaveRider Communications Inc.

cc: Kyle Dixon

Changing the Way
the World Connects

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Changing the Way
the World Connects

Internet access is quickly becoming an essential service for businesses and households. As the Internet grows, so does the demand for faster connections to support more advanced applications.

However, many communities have little or no access to the Internet. High-speed access has historically been limited to urban areas, leaving other regions without accessible or affordable broadband services.

WaveRider is changing the way the world connects to the Internet.

WaveRider's broadband wireless products have been installed around the world to deliver high-speed Internet access to businesses and consumers. With WaveRider's wireless systems, Internet subscribers now have access to reliable, 'always on' broadband services to support their growing communications needs.

For service providers, WaveRider's wireless products offer the opportunity to own and operate their own Internet network, providing greater control over their services and their profits. For a small initial investment, service providers can install a WaveRider base station that will serve hundreds of users via wireless modems that can be easily installed at their customers' premises. As the subscriber base grows, more base stations can be added to serve thousands of customers.

WaveRider's products have also made it possible for a variety of organizations, from Internet Service Providers to municipal governments to utility companies, to own and operate their own wireless network to bring much-needed broadband service to their communities.

WaveRider's Last Mile Solution® products have enabled organizations around the world to deliver reliable, high-speed wireless Internet access.

Utility Companies

As the telecommunications division of a utility company serving many communities in Illinois, IlliCom recognized the potential for broadband access to quickly become an important and profitable addition to its service portfolio.

IlliCom has deployed WaveRider's Last Mile Solution™ system and is now delivering high-speed wireless access to homes and businesses that could not access broadband service via wired networks. The LMS has also enabled IlliCom to add customers quickly and at a very low cost per customer.

> "With the high capacity and scalability of the LMS system and the low customer installation costs, we can generate a quick return on our investment."
>
> -Kevin Osterbur
> IlliCom
> Paxton, Illinois

> "Broadband access is becoming an essential service for businesses and many homeowners. WaveRider's Last Mile Solution® products have enabled us to deliver this service quickly and easily."
>
> -Merton Auger
> City of Buffalo
> Buffalo, Minnesota

Municipalities

The City of Buffalo, Minnesota has become one of the first municipal governments in North America to establish and operate its own high-speed wireless network using WaveRider's Last Mile Solution® products. By installing and operating its wireless system, the City's Council has enhanced the quality of life in its community by delivering the broadband services its businesses and residents need.
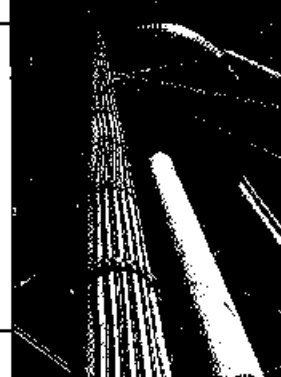
Bringing high-speed Internet
access to communities around the world

WaveRider Products

WaveRider's Last Mile Solution* Product Family

WaveRider's Last Mile Solution* (LMS) products are wireless broadband systems that enable service providers to deliver high-speed Internet access to commercial and residential subscribers. The LMS family includes the first commercially available non-line-of-sight system for the license-exempt 900 MHz spectrum. Combining both 900 MHz and 2.4 GHz license-exempt spectrum equipment, WaveRider's LMS products can be deployed in a wide range of environments and deliver speeds ranging from 64 Kbps to 11 Mbps.

WaveRider's Last Mile Solution* is the ideal solution to help you to grow your business, increase your revenues and deliver the highest quality of service to your customers.

WaveRider's NCL Series

WaveRider NCL (Network Communications Link) product series is designed for Point-to-Point or Point-to-Multipoint wireless connections. Delivering speeds of up to 11 Mbps in the license-exempt 2.4 GHz spectrum, the NCL is the best choice to establish wireless links for private networks or system backhaul.

With a greater power output than many other 2.4 GHz wireless products, the NCL does not require an external amplifier, reducing your equipment costs.

Internet Service Providers

Platinum Communications of Alberta, Canada, was the first Internet service provider to install WaveRider's Last Mile Solution* products. Since the launch of its wireless service in 2000, Platinum has expanded to several communities throughout southern Alberta. The company is quickly building market share and growing its base of commercial and residential subscribers by delivering an affordable, reliable alternative for broadband access.

By bringing broadband wireless service to its region, Platinum has generated the support of businesses and local community and government groups. The company's early success using WaveRider's LMS systems has contributed to its rapid growth and garnered support from the investment community to expand its operations.

> "WaveRider's innovative technology has enabled Platinum to compete with the large service providers in our region. Our business model and delivery of wireless services are changing the broadband landscape in Alberta."
>
> *- Allen Stretton*
> *Platinum Communications Inc.*
> *Alberta, Canada*

> "The availability of traditional broadband service is lagging behind the demand in our market. WaveRider's Last Mile Solution® has enabled us to 'bridge the digital divide' for our customers."
>
> *-Ken Richardson*
> *Daltron Electronics Ltd.*
> *Papua, New Guinea*

Technology and Service Providers

As a leading technology provider in Papua New Guinea, Daltron Electronics required a cost-effective solution to expand its coverage area to serve its growing Internet customer base. Daltron chose WaveRider's Last Mile Solution* because it was the only available solution that offered non-line-of-sight connections, the ability to connect new users quickly, and a profitable business model that would enable Daltron to expand its services over time.

WaveRider's Product
Features at a Glance

Last Mile Solution® Systems

WaveRider's Last Mile Solution* (LMS) series of wireless broadband products offer the most reliable and cost-effective solution to deliver high-speed Internet access over the 'last mile'.

Non-Line-of-Sight connections allow for easy installation and simple network design and enable operators to serve customers in areas that cannot be reached with a line-of-sight connection.

User-installed wireless modem and indoor antenna for non-line-of-sight connections eliminates the need for expensive professional installations.

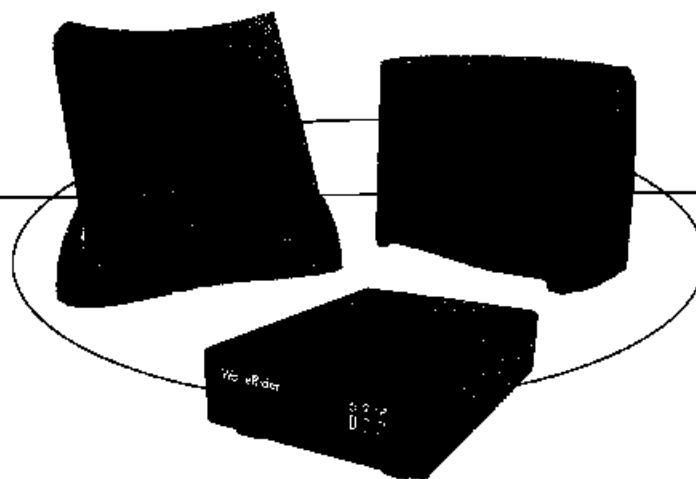**License-exempt solution** makes it cost-effective to deliver service over the 'last mile'.

WaveRider's Dynamic Polling MAC eliminates packet collisions, enabling more reliable service to a greater number of subscribers on a single system.

Commercial-grade service delivers the speed and reliability your customers need and allows you to compete with other service providers.

Rapid return on investment enables a more profitable business model.

Scalable solution allows you to start with a smaller system and easily expand your network as your subscriber base increases.

Professional services and support from WaveRider's Professional Services Group will help ensure quick and easy deployment and optimal network planning for your area.

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www.waverider.com

For more information on WaveRider Communications Inc., our products and our services, please visit our website at www.waverider.com

License-Exempt Broadband Wireless Presentation to the FCC

September 25, 2002

Wá√eRider·
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Our Mission

- Design and develop unique high-speed wireless Internet access networks using unlicensed spectrum in the 902-928 MHz and 2.4 GHz bands
- Industry's first non-line-of-sight, plug-and-play wireless network in license-exempt bands
- Over 100 systems currently operating in 27 states and internationally

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How We Got Here

- Established 1998
- Experienced Management
  - Bruce Sinclair, President & CEO
    - formerly CEO, DELL Europe, President, DELL Canada
  - Jim Chinnick, VP Engineering
    - formerly VP Harris, NovAtel, Nortel
  - Scott Worthington, CFO
    - formerly CFO Dell Canada
  - Charles Brown, Vice President Sales and Marketing
    - formerly VP Clearnet Communications, Bell Mobility

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How We Got Here

- 56 employees with offices in Canada, the United States and Australia
- Publicly traded on the OTC Bulletin Board – symbol WAVC
- Revenue growth target over $8 million for 2002
- Executive Committee Member, License-Exempt Alliance

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Broadband Deployment

- Demand for broadband is accelerating
- The Yankee Group predicts that the number of U.S. dial-up users in 2002 – 54.4 million – will drop to about 40 million in 2007, while broadband will grow from 19 million in 2002 to 48.1 million in 2007
- Cable modem and DSL remain the dominant broadband access technologies
- Broadband still unavailable in many areas – wireless regarded as best solution to bridge the digital divide

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What Has Held Wireless Back?

- Until recently technology and products with robust, high-speed features unavailable
- Line-of-sight limitation
- Customer premise equipment prices too high
- Truck roll required; no self-install capability
- No solution that provided a workable business case

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The Growth of Wireless Internet Providers - WISPs

- License-exempt spectrum in 902-928 MHz, 2.4 GHz and 5.8 GHz bands
  - Accessible
  - Low-cost
- Leading wireless broadband growth – over 1,000 WISPs in the U.S.
- According to In-Stat/MDR the market for license-exempt wireless residential subscribers in the United States will grow from 123K in 2001 to almost 2.5 million by 2006

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WaveRider's Last Mile Solution

- License-exempt spectrum at 902-928 MHz and 2.4 GHz
- Non-line-of-sight capability at 902-928 MHz – significantly reduces terrain, foliage and in-building limitations
- Indoor antenna -- customer self-installation; no truck roll
- Viable business case for service providers

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WaveRider's LMS4000

- Dual-band carrier class wireless network
  - 902-928 MHz and 2.4 GHz
- Non-line-of-sight customer modem using 902-928 MHz
  - Actual throughput of up to 2 Mbps
  - NLOS range up to 1½ miles; LOS range up to 8 miles
- Line-of-sight customer modem using 2.4 GHz
  - Actual throughput of up to 8 Mbps
  - Range of up to 10 miles

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Benefits to Customers

- First to market non-line-of-sight, self-installable wireless modems in license-exempt bands
- Interior antenna means no truck roll
- Grade of Service – up to 4 levels of customer service
- Like cable modem -- always on, no telephone line required

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Benefits to WISPs

- WaveRider's customers include ISPs, municipalities, utilities, cellular and PCS providers, rural co-ops, and local telephone companies
- Low-cost entry – less than $10,000 to deploy basic network - less than $600 for customer equipment
- Scaleable growth – no minimum or maximum limit to number of subscribers on one network
- Easy and fast build-out – rapid payback
- Patent pending Dynamic Polling MAC – up to 900 subscribers from one cell site

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Why 900 MHz?

- At first glance the band has many disadvantages:
  - Crowded spectrum – in use by a multitude of other devices for a wide range of applications
  - Limited spectrum – only 26 MHz
- Propagation characteristics of the 902-928 MHz band a key advantage:
  - Provides good in-building and tree canopy penetration
  - NLOS capability provides operators with a strong business case

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Key Technology Enablers

WaveRider overcame the challenges of the 900 MHz band through the following:

- Proprietary application of industry standard 802.11b chip set
- Patent Pending Dynamic Polling Media Access Control
- Phase Diversity antenna
- Application Software

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Customer Profile

- City/Municipal Governments
    - City Of Buffalo, MN
    - Ellaville, GA
    - City Of Donna, TX
    - City Of Waupaca, WI
- Rural/Independent Telcos
    - Nicholville Telephone Company, Potsdam, NY
    - Alma Telephone System, Alma, GA
    - Northwest Telephone Cooperative Association, Havelock, IA
- Utilities
    - Runestone Electric – Alexandria Light & Power, Alexandria, MN
    - Illicom Telecommunications, Paxton, Il

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Customer Profile –
City of Buffalo, Minnesota

- Bedroom community to Minneapolis-St. Paul
  - 26 miles north of Twin Cities; 60% of residents commute daily
- Population is 12,000
- No broadband service until municipality deployed system
- Covers 95% of population with NLOS; 5% with LOS
- $29 per month for residential service to $49 per month for business-level service

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LMS Proposal to Undermine
License-Exempt 900 MHz Service
(RM-10403)

- WaveRider's networks are built to co-exist with licensed services – no evidence of harmful interference.
- The 902-928 MHz band is essential for subscribers of wireless broadband in non-line-of-sight environments, as well as other license-exempt users
- Regulatory uncertainty will chill investment and consumer acceptance of WaveRider's products.

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License-Exempt Spectrum Policy – Looking Ahead

- The Commission's proactive regulation of Part 15 has been an enormous success – innovation and competition are prospering as a result
- Where possible, the Commission should continue to identify additional spectrum for unlicensed broadband services (*e.g.*, WECA petition for additional 5 GHz spectrum)
- Revisit Part 15 rules to address increased deployments for outdoor broadband service.
- Work with License-Exempt Alliance to resolve rule ambiguities that have the potential to slow down broadband deployment

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September 10, 2002
WaveRider and RAMTelecom deliver wireless broadband to Canada's rural and northern communities
— Last Mile Solution® will speed the roll-out of high-speed access to new areas—

WaveRider Communications Inc., a leading global provider of fixed wireless Internet access products, today announced RAMTelecom has completed the first phase of deployment of WaveRider's Last Mile Solution® wireless network in Baker Lake, Nunavut, Canada bringing much-needed broadband services to the northern Canadian community.

Ottawa-based RAMTelecom specializes in planning and installing high-speed Internet solutions in Rural and Northern Canada. Schools, businesses and residents in these areas have relied on the networks that have been installed by RAMTelecom as the sole provider of broadband via its satellite services. With the introduction of WaveRider's wireless Last Mile Solution® system to its portfolio, RAMTelecom is preparing to escalate the expansion of its broadband services to more northern communities.

"There is an immediate and critical need for northern and rural communities to have reliable and affordable access to the Internet," said Ralph Misener, president, RAMTelecom. "The technology that has been available has not been affordable or easily accessible in these areas. We believe that our combination of WaveRider's non-line-of-sight solution and our satellite services, as well as our experience in building telecommunications networks specifically for these types of communities will help us to speed the delivery of broadband services – particularly to First Nation, northern, remote and rural communities."

The wireless broadband project is led by members of the Hamlet of Baker Lake's staff and has received tremendous support from local businesses, the school, and the community. "We are very impressed with the efforts of Joe Aupaluktuq, Baker Lake's 'community champion' in bringing high-speed Internet access to the Baker Lake community," said Bruce Sinclair, President and Chief Executive Officer, WaveRider Communications Inc. "Broadband access is important to the region's economic development and to providing access to essential services such as health care and education."

Baker Lake is a remote Arctic community of 1,500 located north of the 60th parallel. More than 45 businesses, organizations and residents in Baker Lake are now accessing the Internet via WaveRider's Last Mile Solution® wireless Internet access system. The system was installed by RAMTelecom in July and it is expected there will be 100 wireless users in Baker Lake before the end of the year.

August 13, 2002
WaveRider's Last Mile Solution® products to be deployed by MapleNet, Inc.
--Indiana-based Wireless Connectivity Solutions provider to install and deploy WaveRider's Non-Line-of-Sight systems for its customers --

WaveRider Communications Inc. has signed an agreement with MapleNet Inc., a wireless connectivity solutions company based in Goshen, Indiana, to resell, support and operate WaveRider's Last Mile Solution® (LMS) systems.

MapleNet plans to integrate WaveRider's LMS products as part of its network deployments for Wireless Internet Service Providers (WISPs) throughout Indiana, and has installed a non-line-of-sight WaveRider system in Goshen to deliver high-speed wireless Internet access to business and residential subscribers. In addition to its wireless network integration business, MapleNet is a WISP that delivers wireless broadband services to over thirty communities in Indiana.

"We have a proven track record of making WISPs profitable," said Gene Crusie, Director of Operations, MapleNet. "With the addition of WaveRider's non-line-of-sight Last Mile Solution® systems to our product roster, we can now help our customers to reach more wireless subscribers, including those in heavily-treed areas that can't be reached with other wireless systems."

"The user-install feature of WaveRider's non-line-of-sight customer premise equipment will help add to our customers' bottom lines," added Crusie. "Eliminating the need for professional installations of equipment at many subscriber locations takes much of the cost out of deploying and expanding a wireless network, which helps to make them profitable sooner."

MapleNet's technicians installed the WaveRider non-line-of-sight system in Goshen, a city with a population of more than 30,000, in July, 2002. Said Crusie, "Our technicians were impressed with their first test of WaveRider's equipment. Having worked primarily with 2.4GHz equipment that is very sensitive to line-of-sight, they were astonished by the connection they could establish between the tower and an indoor antenna placed on the customer's desk next to her computer, a full mile away - with nothing but Indiana hardwood forests in between."

July 30, 2002
WaveRider's Last Mile Solution® to connect Iowa businesses and residents
--Northwest Internet Services expands its Excellernet service using WaveRider's non-line-of-sight wireless products --

Northwest Internet Services, a division of Northwest One, Inc. has purchased and installed WaveRider's Last Mile Solution® non-line-of-sight wireless products to deliver high-speed Internet access in Iowa.

Northwest Internet Services, which offers wireless Internet access to subscribers in 23 communities under its Excellernet service, has installed WaveRider Last Mile Solution®(LMS) equipment in Rolfe and Emmetsburg, Iowa. The company plans to deploy WaveRider's non-line-of-sight products in three additional communities in 2002.

"The WaveRider system has enabled us to deliver high-speed access to more business and residential subscribers than could be reached with other systems," said Chad Lundquist, Networking Specialist, Northwest Internet Services. "Where line-of-sight issues such as tree canopies or buildings had prevented us from connecting subscribers, WaveRider's LMS system is delivering fast, reliable wireless broadband connections."

Northwest has added more than 40 subscribers to its WaveRider network since its system deployment in June and the company expects to have more than 100 new subscribers by fall, 2002. "The indoor antenna and ease of installation of the WaveRider products have been important features in the rapid deployment and expansion of our non-line-of-sight wireless network," added Lundquist.

June 13, 2002
WaveRider's Last Mile Solution® products being deployed in more than 50% of U.S. states
— The latest installations of WaveRider's non-line-of-sight products in Michigan and Colorado indicate growing market acceptance —

WaveRider Communications Inc.'s Last Mile Solution® (LMS) wireless system is now being deployed in 27 states delivering high-speed non-line-of-sight Internet connectivity to consumers and businesses.

"The number, and size, of WaveRider's LMS system deployments are growing in all our target markets and especially throughout the U.S." said Bruce Sinclair, President and CEO, WaveRider Communications Inc.

ISP Management, one of WaveRider's recent customers, provides dial-up, DSL and wireless Internet service to more than 50 communities throughout Michigan. "WaveRider's products are an ideal solution for this part of the country where, surprisingly, high-speed Internet access is not being offered in many communities." said Chris Carey, ISP Management. "With the first LMS system now operating and growing, our plan is to aggressively expand our high speed wireless service to additional communities."

Suburban Broadband LLC, another recent customer, has installed WaveRider's network solution in Castle Pines North, Colorado and plans to expand into additional Colorado communities by the end of 2002. "The key to our deployment in Castle Pines North hinged on WaveRider's indoor antenna which we used in 95% of our customer installations." said Damon Estep, Suburban Broadband LLC. "The municipal government of Castle Pines North did not want unsightly outdoor roof top antennas in their community but willingly facilitated the installation of the LMS system, with its indoor antennas." added Estep.

"Businesses and consumers are demanding high speed Internet access to stay competitive and connected. WaveRider's products are increasingly being seen as a cost-effective and flexible solution to communities throughout the U.S. and the world for high speed connectivity," added Sinclair.

May 23, 2002
WaveRider to supply Last Mile Solution® wireless products to NetStar Communications Inc.
—NetStar to resell, support and operate WaveRider's Last Mile Solution® systems —

WaveRider Communications Inc. has signed an agreement with NetStar Communications Inc., a telecommunications service provider based in Tennessee, to resell, support and operate WaveRider's Last Mile Solution® (LMS) systems.

A provider of telecommunications network solutions for operators throughout the Eastern United States, NetStar plans to integrate WaveRider's LMS products as part of its network deployments for customers throughout its region.

NetStar has begun the installation of WaveRider's LMS non-line-of-sight broadband wireless systems to enable its customers to deliver high-speed Internet services. The systems include wireless modems and indoor antennas that can be easily installed by subscribers, eliminating the need for professional installations for non-line-of-sight applications, and reducing the operators' costs to build the network. In addition to turnkey wireless network systems, NetStar also offers complete outsourced "back-end" support to these customers including: subscriber installation services and technical support, system infrastructure monitoring, reporting and repair, and outsourced e-mail and web hosting.

"Service providers have been seeking cost-effective solutions to deliver broadband services to their customers. WaveRider's Last Mile Solution® products enable us to quickly establish wireless networks for our telecommunications customers that will allow them to easily and affordably increase their subscriber base over time," said John McDade, NetStar Communications Inc.

"NetStar is helping telecommunications companies throughout the Eastern United States to deliver broadband services. With the introduction of WaveRider's Last Mile Solution® systems to its product portfolio, the company can help more operators to build wireless networks and to help them grow their networks as their customer base increases," said Charles Brown, Vice President, Sales and Marketing, WaveRider Communications Inc.

April 3, 2002
WaveRider and Tradewinds Network Services bring the Last Mile Solution® to rural U.S. markets
—Virginia-based systems integrator to resell, support and operate WaveRider's Last Mile Solution® systems —

Tradewinds Network Services (TNS), a telecommunications systems integrator based in Virginia, has selected WaveRider's non-line-of-sight Last Mile Solution® system for deployment in Roanoke, VA, to deliver high-speed wireless services to its Internet subscribers.

Tradewinds Network Services delivers wired and wireless broadband and integration services for the municipal, industrial, commercial, medical and utility markets. The company will sell and support WaveRider's Last Mile Solution® (LMS) products as part of its system deployments for its broadband customers throughout Virginia and other rural markets in the United States and Canada. TNS will also own and operate wireless networks, using WaveRider's LMS systems, in selected markets.

"Broadband service providers in rural markets have distinct requirements for their Internet access equipment," said Patrick McHugh, President of TradeWinds Communications. "WaveRider's products deliver the commercial grade services our customers need, a low-cost license-exempt wireless solution. Its non-line-of-sight systems eliminate the need for professional installation of end-user equipment which supports a more profitable business model for our customers."

"WaveRider's Last Mile Solution® is designed to be an extremely cost-effective, high quality solution to deliver wireless broadband services to the markets in which TNS specializes," said Charles Brown, Vice President, Sales and Marketing, WaveRider Communications Inc. "As TNS helps more service providers throughout Virginia and other states bring high-speed Internet services to their areas, we believe our Last Mile Solution® products, particularly our non-line-of-sight wireless systems, will be an important component of their broadband networks."

January 16, 2002
WaveRider products win industry awards
-- *Wireless Communications Association recognizes WaveRider's Last Mile Solution® for its non-line-of-sight and 'plug and play' capabilities --*

WaveRider Communications Inc. was presented with two awards for its non-line-of-sight Last Mile Solution® products. WaveRider received the 'Non-Line-of-Sight (NLOS)' and the 'Plug N' Play' awards at the Wireless Communications Association's (WCA) 8th Annual Technical Symposium held January 14 to 16 in San Jose, California.

WaveRider's Last Mile Solution® products include the first commercially available non-line-of-sight fixed wireless solution to enable operators to deliver high-speed Internet services to both business and residential subscribers. The system delivers broadband service via a wireless modem and indoor antenna that can be installed by subscribers. These features together have established the Last Mile Solution® as a cost-effective solution for service providers to build a wireless network and generate profits within a short period of time.

"Winning a WCA Wemmie Award is an achievement with significance on several levels. Wemmie Award winners are the true contributors who are making and advancing the industry. Nominated by those who benefit from their products and services, and selected by a jury comprised of leading carriers and consultants, recipients have passed two tests," said WCA President Andrew Kreig. "The Awards are a true indicator of the esteem in which WaveRider and the other Wemmie Award winners are held by the broadband wireless industry at large."

Each of WaveRider's 2002 WCA Awards was based on an evaluation of the City of Buffalo, Minnesota's deployment of WaveRider's products. The City is among the many operators worldwide using WaveRider's non-line-of-sight system. Buffalo's municipal government has deployed the Last Mile Solution® and is now delivering high-speed connectivity to businesses and residences in its community.

"The 'NLOS' and the 'Plug N' Play' awards validate our belief that these products offer a real competitive advantage for WaveRider and our customers," said Charles Brown, Vice President, Sales and Marketing, WaveRider Communications Inc. "Our Last Mile Solution® products have already been purchased by operators around the world who want a reliable, robust, non-line-of-sight system that can be user-installed and is cost-effective to deploy."

December 4, 2001
City of Buffalo, Minnesota launches high-speed wireless Internet service
-- *First phase of wireless network now complete; city-wide service to be available in 2002 --*

The City of Buffalo officially launched the first phase of its high-speed wireless Internet service for residences and businesses in Buffalo. The service is now available in the western, north-western and northern sectors of the City and will be expanded to include other areas in the new year.

The new high-speed Internet service delivers broadband access, which enables users to send and receive large files faster, and access high-bandwidth business, entertainment and communications applications. The City of Buffalo's high-speed service connects users to the Internet via a wireless modem and indoor antenna that connects directly to the user's computer, providing an 'always-on' connection, and eliminating the need to install extra phone lines.

Among the first to subscribe to the City of Buffalo's new wireless Internet Service is the Insurance Center of Buffalo, which has five employees connecting to the Internet via the new service. "High-speed Internet access has increased our ability to communicate with our customers and company, and access information from the Internet quicker and easier," said Ken Ogden, Owner, Insurance Center of Buffalo. "Each of our employees can now access the Internet simultaneously, whereas previously we shared a single dial-up connection. The new service has already helped us to access and share information more easily."

The City of Buffalo introduced its plan to roll out its high-speed Internet system throughout the city earlier this year when Council approved the purchase of the WaveRider Last Mile Solution® wireless system, which was chosen for its non-line-of-sight capabilities and ease and speed of installation.

"The City of Buffalo is one of the first cities in the United States to establish a high-speed communications network that is owned and operated by the City," said City of Buffalo Mayor Fred Naaktgeboren. "High-speed communications has become an essential service to serve existing businesses and residents and to attract new businesses and services to the city. Our model is already being examined by other cities in Minnesota and other states that want to establish networks of their own."

The new network delivers high-speed Internet access via non-line-of-sight wireless connections that transmit data to and from nearby base stations. The WaveRider system includes a wireless modem and indoor antenna which can be installed by the subscriber. The wireless modem connects directly to the user's computer and delivers connection speeds of up to 1.4 Mbps, depending on the service level chosen by the subscriber.

"The introduction of our high-speed wireless service has gone very smoothly, with our first 50 subscribers on-line within the first 10 days. We expect to have 200 subscribers by the end of the year, and to increase this number dramatically in 2002," said Merton Auger, City of Buffalo. "Our wireless network has proven to be a cost-effective solution, enabling us to offer high-speed services at prices ranging from $29 per month for residential service to $49 per month for business-level service, which are very competitive compared to traditional wireline high-speed services."

November 20, 2001
Minnesota utilities launch high-speed residential wireless Internet service using WaveRider's Last Mile Solution® products
-- REA-ALP Internet Services completes installation of WaveRider's non-line-of-sight system --

WaveRider Communications Inc. announced that REA-ALP Internet Services has added another option to its high-speed wireless service in Alexandria, Minnesota, using WaveRider's non-line-of-sight Last Mile Solution® products.

An alliance between two Minnesota utility companies, Runestone Electric Association and Alexandria Light and Power, REA-ALP expects to have an additional 125 subscribers on its wireless network by January, 2002. REA-ALP Internet Services currently serves more than 5,500 subscribers on its dial-up services and over 125 customers with other commercial broadband offerings. The deployment of its new wireless service will provide a more affordable broadband solution, primarily aimed at residential customers.

REA-ALP has installed and deployed WaveRider's LMS3100 non-line-of-sight wireless system, which delivers Internet access speeds up to 1.4 Mbps via a wireless modem and indoor antenna that can be installed by the user. The modems connect by way of a license-exempt 900 MHz connection to antennas on a newly-built tower at the Alexandria water treatment plant, then by fiber optic cable to the Internet.

"WaveRider's non-line-of-sight wireless systems were the best and most cost-effective solution we could find to bring high-speed Internet services to our subscribers," said Jay Clark, REA-ALP Internet Services. "The WaveRider systems enable us to meet our customers' demand for greater bandwidth for broadband applications, 'always-on' connectivity without tying up their phone lines, and immediate access, without having to wait for equipment installations."

REA-ALP was recently named the 2001 Business and Industrial Award winner by the Alexandria Lakes Area Chamber of Commerce and Alexandria Area Economic Development Commission. The company was recognized for its growth and success, its contribution to the success of other businesses in the area, and its innovative solutions. The REA-ALP alliance is also recognized by these organizations as a unique example of an electric cooperative and municipal utility working together to provide Internet service.

"As the Internet and telecommunications markets continue to evolve, non-traditional Internet service providers such as utility companies and municipalities are growing in number, and are looking at wireless solutions as a cost-effective way to deliver these services in their markets," said Charles Brown, WaveRider's Vice President of Sales and Marketing. "REA-ALP Internet services is an example of a non-traditional ISP that has had tremendous success, and we look forward to working with them to roll out their Last Mile Solution® system to bring high-speed wireless Internet access to their customers."

October 29, 2001
WaveRider's Last Mile Solution® to connect Michigan Internet subscribers
-- Spectrum Global Communications establishes wireless network to serve small business and residential customers using WaveRider's non-line-of-sight systems --

WaveRider Communications Inc. announced that Spectrum Global Communications has purchased WaveRider's Last Mile Solution® non-line-of-sight Internet access products to establish its wireless network in Northern Michigan.

Spectrum, a computer network solutions provider and high end systems integrator, has completed the installation of WaveRider's LMS3100 system and will officially launch the first phase of its wireless broadband service to small businesses and residents in Gaylord, Michigan in November, 2001. Spectrum expects to have 500 subscribers on its network by the end of the year and will expand its wireless network to serve several additional Michigan communities in 2002.

"Wireless technology has proven to be a reliable and cost-effective solution for many of our commercial customers who require high-speed Internet communications," said Jeff Scott, President, Spectrum Global Communications. "Until now, the challenge in our industry has been to find a cost-effective means to deliver these services to residential and small business customers. The LMS3100 enables us to provide the services these customers need, and to generate a rapid return on our investment."

WaveRider's LMS3100 is the world's first commercially available wireless system designed to deliver broadband Internet access at speeds of 1.4 Mbps (megabits per second) via a non-line-of-sight connection. The LMS3100 operates in the license-exempt 900 MHz spectrum, and includes a wireless modem and indoor antenna that can be easily installed by subscribers, eliminating the need for professional installations.

"The area that Spectrum serves has experienced tremendous growth over the last few years. It is these newly-developed areas that have an immediate need for broadband access in order to attract more businesses and residents to the area," said Charles Brown, Vice President, Sales and Marketing, WaveRider Communications Inc. "WaveRider's Last Mile Solution® products enable companies like Spectrum to deploy their networks in a very short period of time, at a relatively low cost compared to traditional wired networks, and begin to offer service immediately."

September 26, 2001
WaveRider and IlliCom Telecommunications expand wireless network in East Central Illinois
-- WaveRider's non-line-of-sight wireless network enables IlliCom to add residential and small business service to its high-speed Internet offerings --

WaveRider Communications Inc. (NASDAQ: WAVC), a leading global provider of fixed wireless Internet access products, today announced that IlliCom Telecommunications has purchased WaveRider's Last Mile Solution® system to expand its wireless network. IlliCom will introduce broadband Internet access to residential and small businesses in East Central Illinois via WaveRider's LMS3100 non-line-of-sight wireless products.

IlliCom Telecommunications, a subsidiary of Eastern Illini Electric Cooperative, will launch its wireless services to residential and small business subscribers in the area surrounding its central office in Paxton, Illinois. The WaveRider LMS3100 network expands IlliCom's existing wireless services which were introduced in December, 2000 to deliver high-speed Internet access to IlliCom's commercial customers.

"As a provider of dial-up Internet service, we know there is significant demand for high-speed Internet services throughout East-Central Illinois, especially in more rural areas that do not have access to traditional wired services," said Kevin Osterbur, Business Manager, IlliCom Telecommunications. "WaveRider's LMS3100 system is an ideal solution for us to install a network quickly and cost-effectively and begin offering wireless broadband services to our customers."

WaveRider's LMS3100 is the world's first commercially available wireless system designed to deliver broadband Internet access at speeds of 1.4 Mbps (megabits per second) via a non-line-of-sight connection. The LMS3100 operates in the license-exempt 900 MHz spectrum, and includes a wireless modem and indoor antenna that can be easily installed by subscribers, eliminating the need for professional installations.

IlliCom will launch its LMS3100 wireless service to its first 100 residential and small business subscribers in Paxton in October and plans to install two additional Communications Access Points (CAPs) before the end of the year to further expand its wireless network.

Hybridized 900 MHz NLOS Systems

Four Companies Share Their Real-World Experiences
Deploying WaveRider's 900 MHz Radios

By Timothy Sanders

Claims abound from companies developing new non-line-of-sight (NLOS) broadband wireless systems. Certainly, these new technologies are exciting and hold enormous promise. However few providers have systems in actual commercial deployment. In actuality, just one vendor has been in commercial deployment with an unlicensed spectrum NLOS system for longer than six months.

The WaveRider 900 MHz fixed wireless system is a true NLOS product. The system launched commercially in March 2001 and received a second-generation software upgrade recently. However, there are industry concerns about interference and bandwidth capability in this band. Additionally, most fixed wireless ISPs have entrenched products deployed in 2.4 GHz or 5.8 GHz spectrums. Service providers cannot just throw these investments out the window.

These issues bring up a number of questions. Can providers hybridize existing systems with 900 MHz products? If so, will it deliver the necessary bandwidth and operate without interference? Finally, will it deliver value?

Before addressing these questions with input from actual service providers, it helps to examine some relevant definitions.

Non-Line-of-Sight vs. Near-Line-of-Sight

What is the exact difference between a near-line-of-sight and NLOS product? The short answer is that signals from NLOS systems can actually penetrate obscuring objects. A near-line-of-sight product can deliver service to a location that is partially obscured, but not totally.

Many modulation schemes take advantage of multipath by allowing partially obscured sites to receive signals bounced from adjacent buildings. The multiple signals are integrated with advanced processing techniques. This type of system is near-line-of-sight.

However, if no reflected line-of-sight (LOS) exists from the access point to the client site, signals won't carry. In contrast, an NLOS system penetrates tree cover and walls directly. The primary tradeoff is the decreased range of the new systems. WaveRider claims that its product has NLOS capability with indoor antennas from one to two miles, with outdoor antennas from two to four miles and LOS coverage from six to eight miles.

The farther up the spectrum chart a signal is generated, the greater its bandwidth potential. As frequencies drop to longer wavelengths, penetration increases. Therefore a 900 MHz radio will penetrate leaves and walls better than a 2.4 GHz or 5.8 GHz radio. However, it will inherently deliver less bandwidth. The question is: Is the bandwidth sufficient to deliver quality service? WaveRider answers with an emphatic "Yes."

The Technology

WaveRider designed each radio to handle

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hundreds of users. Users can commonly expect 384k to 512k speeds with heavy loads. With fewer associations, the radios can deliver up to 2 Mbps service in both directions. In the real world, few fixed wireless deployments, especially rural ones, exceed 100 customer associations per sector. Happily, competitor's services tend to top out at 1 Mbps.

"Our base stations operate in an array of three 120 degree sectors, and each can handle up to 300 associations," said Charles Brown, vice president of sales and marketing at WaveRider. "We believe that our system offers at least the same level of service as cable and DSL."

WaveRider recently released a dynamic polling MAC (Medium Access Control) expressly to improve effective bandwidth. WaveRider's approach is basically the opposite of the older carrier sense multiple access/collision avoidance (CSMA/CA) where radios "listened" for a space to send signal.

As traffic scales with CSMA-type systems, collisions increase and service degrades quickly. With WaveRider's polling MAC, the base station polls each radio in turn to transmit. This significantly reduces packet collisions. The base station skips radios that are inactive, reducing wait times for busy users. Every few cycles, inactive units are repelled, giving them a chance to reenter the queue.

"Our polling MAC reduces collisions and retransmissions," Brown said. "This effectively increases bandwidth, since packets transmit the first time. It ensures a more gradual, less severe service degradation as traffic increases."

Still, significant questions remain. Do these radios meet the business case? Also, is interference really a problem?

The Question of Interference

The most common complaint heard about 900 MHz is that it is "busy" spectrum. WaveRider maintains that, for two reasons, that's not a problem. First, there is less "outdoor" 900 MHz signal (902-928 MHz) than in the 2.4 GHz range, WaveRider says. The primary competitors are paging systems, which use adjacent channels. Second, interference concerns are prevalent because of the use of 900 MHz phones in households, but WaveRider asserts signal processing avoids the potential problem.

"The radio chipsets we use have much more capability than the units in portable phones," Brown said. "Its signal processing rejects erroneous adjacent signals with incredible accuracy."

Brown explained that there is more interference in the 2.4 GHz space than providers realize, including microwave ovens, 2.4 GHz phones, LANs and multiple wireless Internet service providers (WISPs).

As discussed below, conversations with WISPs seem to bear out Brown's contention. Still, one wonders what WISPs get for their money.

Traffic Shaping, Mapping and Turnkey Kits

Along with new dynamic polling MAC software for its 900 MHz product, WaveRider built some traffic-shaping capability into the software.

"The service provider can deliver tailored service speeds at the individual customer level," Brown said. "This capability is built into the unit at no extra cost."

WaveRider sells starter kits for operators setting up wireless networks. With each starter kit sold, WaveRider delivers a signal propagation study for the tower site used.

"We need the WISP's antenna height, latitude and longitude to generate a propagation map," Brown said. "We provide ranges of coverage for each site. Our database covers the United States."

WaveRider explains that the kit doesn't include a shadow study. However, those add-ons, and more, are available.

WaveRider wants to reach small providers with its starter kits. Kits include cabling, lightning protection, a base station, six client radios, antennas and two days of training.

"Customers won't need a lot of third-party equipment or software to get started with our product," Brown said. "Our systems include everything customers need to deploy our product."

This all sounds terrific, but final questions remain. Is the business case met? What are the results from real-world operations?

The Business Case

WaveRider believes its products are scalable to communities with upwards of 200,000 people. However, WaveRider's view is that providers stand their best chance in underserved markets.

"Our sweet spot is towns of 50,000 or less," Brown said. "Those towns aren't necessarily rural. Buffalo, Minn., for example, is only 45 minutes from Minneapolis/St. Paul."

WaveRider radios support 300 users per sector. However, few WISPs deploy that many users per sector initially. So the company evolved a licensing system, allowing the purchase of 20-user initial licenses. Providers save money by upgrading each sector as needed.

Cost savings from self-installation or streamlined installation should perhaps be the overriding consideration for providers, Brown said.

"Comparing an NLOS system to an LOS system is comparing apples and oranges," Brown said. "Even for WISPs that choose to do installs, an NLOS product will save time and money. It just doesn't take as long."

WaveRider possesses a professional services organization along with its mapping team. Few people know about this capability.

"We think we have a great overall package," Brown said. "Our NLOS product, with built-in traffic shaping, mapping services and training, is the best complete product in the industry."

WaveRider makes a strong case that its NLOS product offers a great value proposition. However, can real-world providers make

money with this product? What respondents have to say is very interesting.

EWOL Wireless: Avoiding Trees

DSI launched dial-up service in 1995 in Englewood, Fla. Its EWOL Wireless service debuted with Alvarion gear. The company was and is happy with Alvarion's products. However, Englewood has lots of tree cover causing problems delivering service.

"We've run both systems in tandem for almost a year, since July 2001," said Greg Wanner, president of EWOL Wireless. "Our 2.4 GHz network is very reliable and we like it a lot. Unfortunately it's absolutely LOS dependent."

EWOL deploys its 900 MHz and 2.4 GHz radios on the same towers. Its 900 MHz yagi antennas are from Cushcraft and panels are from Maxrad. EWOL handles backhaul with 5.8 GHz Western Multiplex radios delivering 45 Mbps. Despite some early problems, EWOL's customer base using WaveRider's equipment is growing faster than that for its 2.4 GHz service.

"We had a few problems early on," said Wanner. "WaveRider really responded to those for us. That attitude really upped our comfort level with them. Since then, it's been pretty reliable."

Bandwidth performance seems solid. Customers get 1.2 Mbps service both ways. EWOL reserves its Alvarion gear for customers needing T-1 level speeds. Interference has been a nonissue. EWOL reports minor packet loss when portable phones are switched on and off, but not during operation. EWOL purchased a third-party traffic shaper last year for several thousand dollars, but has since switched to the new built-in tools. It also took advantage of the mapping study.

"The propagation map we got was 80 to 85 percent accurate, even with tree cover," Wanner said. "The 900 MHz gear is really good with foliage out to about four-and-a-half miles with flat-panel antennas."

EWOL does most installs itself, usually with an external antenna. However, 60 percent of those are mounted inside the building within three miles.

"This gear handles both trees and attic wall penetrations within about one-and-a-half miles almost every time," Wanner said. "We're picking up a lot of cable modem customers with this service."

EWOL sectors handle 32 or 33 associations without any bandwidth problems. However,

the polling MAC release really improved performance. Its Alvarion gear typically is loaded with eight T-1 customers per radio.

Spectrum Global: Doing More

Gaylord, Michigan's Spectrum Global debuted two years ago. Spectrum began service with several products, which it still uses. These include Cisco's 2.4 GHz Aeronet, Alvarion's 2.4 GHz FHSS (frequency hopping spread spectrum) product and WaveRider's 900 MHz unit. Spectrum handles backhaul with Trango Broadband's 5.8 GHz radios. Spectrum asserts that 900 MHz coexists well with other gear. However, it keeps the Cisco and BreezeNet equipment at two miles apart. The DSSS (direct sequence spread spectrum) seems to hold up better to interference for Spectrum.

"We've found that we could do more with WaveRider," said Paul Smith, director of operations at Spectrum Global. "About 60 percent of our network growth is from that prod-

"The software upgrade improved connection throughput and packet loss dropped," Smith said. "It seems that signal strengths improved also."

The company mixes both indoor and outdoor antennas and customers do some self-installs. However, Spectrum finds that customers prefer that it handle installs.

"We took advantage of the propagation mapping," Smith said. "It was pretty accurate, but the equipment usually performed better than stated."

Spectrum relieved its interference concerns with an analysis study. Spectrum found paging in some other 900 MHz channels. More activity existed in the 2.4 GHz range. Home phone systems haven't been a problem.

"We're a 3Com IP phone dealer and have customers using both 2.4 GHz and 5.8 GHz with those," Smith said. "We haven't tried that with the WaveRider gear, but we're planning to. We have 50-employee companies on that product already."

. . . .

The most common complaint heard about 900 MHz is that it is "busy" spectrum. WaveRider maintains that, for two reasons, that's not a problem. First, there is less "outdoor" 900 MHz signal (902-928 MHz) than in the 2.4 GHz range, WaveRider says. The primary competitors are paging systems, which use adjacent channels. Second, interference concerns are prevalent because of the use of 900 MHz phones in households, but WaveRider asserts signal processing avoids the potential problem.

. . . .

uct. All of our residential and some SOHO customers are on it. We do VPN services with these radios."

Spectrum agrees that there were early problems. However, Spectrum asserts that WaveRider really responded to it. It is happy with the bandwidth delivery and is using the built-in traffic shaper. The company offers up to 1 Mbps services to customers.

Spectrum gets NLOS service at six-and-a-half miles out. They praised the new polling MAC.

IlliCom: Quick Installs at Lower Cost

Paxton, Illinois' IlliCom Telecommunications provisioned its first dial-up customers in 1998. IlliCom began wireless services with 2.4 GHz gear from both WaveRider and Cisco. It later added a 900 MHz system.

"We started service with 2.4 GHz gear," said Kevin Osterbur, business manager at IlliCom. "Unfortunately the tree cover only allowed provisioning of 20 to 30 percent of potential customer sign-ups."

All company gear is colocated on the same towers and coexists very well. IlliCom gets NLOS service up to 1 mile with 70 percent indoor vs. 30 percent outdoor antenna installs. From one to one-and-a-half miles, the ratio reverses to 30/70. Above one-and-a-half miles IlliCom uses outdoor antennas. LOS service is successful with outdoor antennas up to five-and-a-half miles.

The company is very happy with the WaveRider's new polling MAC and bandwidth management, which it uses.

IlliCom conducted extensive spectral analysis in its first market and 12 surrounding expansion communities. It found amateur radio, paging and utility company use.

"There was a lot of activity above 928 MHz and below 902 MHz," Osterbur said. "However, the channels we're using were relatively clear."

IlliCom plans to deploy voice-over-Internet Protocol (VOIP) soon with help from a sister company. Signal quality is important. IlliCom does all installs itself for business reasons. The company finds that indoor antenna installs are considerably quicker and cheaper with 900 MHz radios. It's also much easier to recover equipment.

"We often do indoor installs in an hour or so," said Osterbur. "This is a big-time savings for us."

REA-ALP: Comparable Speed

REA-ALP is a utility cooperative in Alexandria, Minn. Originally a dial-up provider, it serves over 7,000 customers today. Today REA-ALP contends with eight ISPs, Charter cable and Sprint DSL.

The company provisioned its first wireless customers three years ago, using Alvarion products. That network is still in use and growing.

"Both wireless networks have unique strengths," said Jay Clark, Internet system administrator at REA-ALP. "We plan to continue using both."

The Alexandria area boasts a 40 to 60 foot tree canopy and lots of lakes.

"In the summer, 2.4 GHz deployment is tough when the lakes open and trees bloom," Clark said. "The 900 MHz gear does much better over lakes and through trees."

REA-ALP's ratio of indoor to outdoor antenna installs is 30 percent vs. 70 percent. Its longest indoor antenna shot is 1.4 miles.

"We reliably get NLOS service at about one-and-a-half miles," Clark said. "With outdoor antennas we have LOS customers at 4.7 miles."

REA-ALP is also concerned with interference, and completed a spectral analysis of its area. It found no traffic in the 900 MHz license-free channels. There was 900 MHz paging in channels above that. In its experience, cordless phones don't interfere with broadband. However, if both are in the same room, callers sometimes hear static. With a full room between the two, there were no problems.

REA-ALP reports the new polling MAC is a marked improvement. Bandwidth seems better utilized also.

"We had problems with hidden nodes previously," Clark said. "The software upgrade eliminated them completely. It's dropped support calls a lot."

REA-ALP originally invested in third-party traffic shaping software. However, it's switched to the new built-in system. It offers five "grades of service," including the deny setting. REA-ALP's speeds begin at 128k. Service of 1 Mbps is available across the wireless network.

REA-ALP reports that residential customers are the heaviest users of bandwidth, so the company focused its WaveRider 900 MHz product on them. REA-ALP says that the NLOS capability grows the WaveRider business for them.

"The 2.4 GHz and 900 MHz products go head to head speed-wise," Clark said.

REA-ALP found that customer self-installs worked, but took about as much telephone support time as an install would.

"Interior antenna installs are very fast," Clark said. "The actual RF install time can be just a few minutes."

Clark reports that outdoor installs are never less than an hour. REA-ALP's installers do throughput, ping and other tests before entering results on an online form. The tech then spends time teaching the customer some basics.

"The most important aspect of deploying wireless is a good business plan," Clark said. "We shoot for customer profitability in eight months."

Bottom Line

Based on practical operator experiences, WaveRider's 900 MHz products deliver the necessary bandwidth, are interference free and meet the necessary business case.

WISPs consistently cite a lack of NLOS products as their biggest hurdle to overcome. The flurry of NLOS systems arising to meet this need is encouraging. However, veteran WISP operators relate that dependable products have a deployment history.

It's telling that customers report significant improvements from WaveRider's new software release. The lesson here is that it takes time to fine tune products for the field.

WaveRider's 900 MHz products are the only unlicensed spectrum NLOS system on the market with a deployment history. It appears its lessons have been learned. Prospective WISPs searching for an NLOS vendor should keep this clearly in mind.

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Northwest Communications, Growing Against the Grain

LATEST RESEARCH REPORT

ISP Evolution: Providing Services for the 21st Century

A small, local telephone company proves that it can do it all in Iowa—voice, dial-up, cable, and wireless—you name it, Northwest Communications provides it.

by Gerry Blackwell
[August 27, 2002]

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All over America you'll find little pockets, usually in rural areas, where big telephone companies never held sway. Instead, small firms served their local communities, holding out for years against the giant Regional Bell Operating Companies (RBOCs) that surrounded them.

Many of these firms still operate. Northwest Communications in northwest Iowa, now an Internet service provider and wireless ISP as well as a telephone company, is one.

Like other local exchange carriers Northwest went into the ISP business (in 1995) to meet demand from existing customers, initially offering dial-up services. Unlike most other small, co-operative LECs, however, it has ridden the success of its Internet operations to expand well beyond its original service area.

When it was just a phone company, Northwest did business in a 23 square mile oasis around tiny Havelock, where it's headquartered. Now it operates across thousands of square miles of northwest Iowa, in some 60 communities altogether.

Using wireless technology to offer high-speed service, which the company has been doing since 2000, was critical to the success of this expansion.

Northwest does offer digital subscriber line (DSL) services in some of its own telephone exchange areas. It even offers cable modem service in a few communities, piggy-backing on Spencer Municipal Utilities, a municipally-owned open-systems cable operator. But

wireless has been its main play in the high-speed Internet access market.

Today the company offers wireless service in 22 communities from about 30 tower sites. It has approximately 360 wireless customers. That still represents a small percentage (4.3 percent) of the total—about 9,000 altogether on dial-up, DSL, cable and wireless.

But wireless contributes 9.2 per cent of annual revenues—about $2 million—and it's growing faster than other access modes.

"It was business customers mostly at first," general manager Donald Miller says of the wireless market. "But now they probably only represent five percent. The residential customers have been taking to it like crazy."

The company's low-end offering is a 128-Kbps service. It also has a 256-Kbps burstable service.

Uncommon structures

Northwest has a novel distance-based pricing structure. Customers within 15 miles of a service depot pay $39.95 a month, everybody else pays $44.95. The large distances involved in sparsely-populated rural northwest Iowa means truck rolls—"windshield time," as Miller puts it—is an even more important cost factor than other places.

In a few of its markets where competitors are offering 256-Kbps or 512-Kbps service, Northwest is at least initially at a disadvantage with its 128-Kbps offering, Miller admits. But the company believes it can ultimately offer a higher quality service and more consistent performance by constraining bandwidth.

This is borne out by customers who try one of the competitors' supposedly faster services and then switch to Northwest—or in some cases, back to Northwest—because of the poor service and performance they receive.

"Some of these customers are saying ours is faster at 128 Kbps than what they were getting with 256 Kbps [from competitors]," Miller says. "It really goes back to what you've got in the backbone."

Northwest initially deployed 2.4 GHz equipment for local loops and a mix of 2.4 and 5.8 GHz wireless and wireline links for the backbone.

It recently began deploying 900 MHz non-line-of-sight (NLOS) LMS4000 equipment from Toronto-based WaveRider Communications Inc. in communities where it couldn't reach customers because of line of sight problems. (Iowa being fairly flat, trees are the main problem, Miller explains.)

Northwest is offering 900 MHz-based service in two communities so far. It will deploy the technology in another three markets later this year, and in an as yet undetermined number next year.

The service has been a success, with 45 new customers hooked up since the launch a few weeks ago, and another 20 on a waiting list. And there are lots more customers out there, Miller is convinced.

"We didn't anticipate this level of demand right away, so now we're having some problems right now getting equipment [from WaveRider]," he says.

That's about his only complaint about the technology, though. In general it has delivered exactly what the company wanted.

"We love the reliability," Miller says. "There are no external holes [made] in the house [when installing the antenna] and there are no icing or wind problems, which there are with 2.4."

Supportive services
Installations have been a breeze—most, as expected, indoors. Northwest still sends out a technician—partly because it happens that employees from its installation team live in both communities served. But as the company starts deploying in towns further afield, it will consider trying user installation, Miller says. Other LMS4000 ISPs have done this successfully.

In most of Northwest's markets, it has at least some competition, the two biggest broadband competitors being multi-channel multi-point distribution system (MMDS) provider Evertek Inc. and regional cable modem service provider Mediacom Communications Corp. Miller guesstimates his company's market share at between 25 and 60 percent. It varies from market to market depending on the competition and how long Northwest has been in the community.

"We have a fairly good customer base that we've been able to keep for a long time," he notes.

How does Northwest hold off its bigger, deeper-pocketed competitors.

"I think customer service is the key," Miller says. "That's what gets most of the credit from customers—having a good technical support line. We don't run 24-by-7, but we do have people who are really concerned [about providing service]. That's the one [factor] that keeps bringing [customers] back to us. We get e-mails from them telling us so."

More broadband competition is coming, he says—a cable modem service provider in Emmetsburg, for example. Northwest will push

the fact that it's a local Iowa company. As Miller points out, "[our customers] don't have a long way to go to get to our headquarters building."

Money-wise

Another factor in Northwest's success is that like many other small, community LECs, it has always been fiscally conservative. The 900 MHz roll-out, for example, is being funded entirely from receivables from the Internet business. The company has no plans to seek outside financing for further expansion.

But then it doesn't have terribly ambitious plans for expansion either. It will probably expend most of its effort and capital in the short and medium terms on installing 900 MHz gear in markets where it already has 2.4 GHz infrastructure.

This is in part because it wants to catch the customers it can't reach with 2.4 GHz, but also partly because it can deploy inexpensively using the same towers (often grain elevators) as it uses for the 2.4 GHz antennas where it already has already paid for access rights.

If it does begin to expand out of its current operating area it will probably be using the 900 MHz technology, not 2.4 GHz, Miller says.

In the meantime, the Internet services operation is close to profitability. It is already cash-flow positive, but funding the start-up of a Web site development service—and before that the 900 MHz launch—has held it back from reaching break-even overall, Miller explains.

Not bad for a company that grew from a footprint of 23 square miles.

—End

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Broadband Networking News

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Rural Georgia Town Builds World's Fastest Water Tower

Aug 13, 2002

While cable and telephone companies have started seriously pursuing broadband customers in major markets, smaller cities and rural areas are still getting the short end of the stick. In what may well be the start of a nationwide trend, a growing number of towns outside providers' preferred footprints are finding ways to build their own community-owned broadband access networks. There are various operational and financial challenges but, especially with the rise of wireless systems operating in unlicensed bands, more small towns are finding that locally-owned broadband can fit into their plans.

Ellaville, Ga., is a fairly typical southeastern small town. Located in southern Georgia, approximately 120 miles from Atlanta in a region of gently rolling hills and pine trees, Ellaville had a population of 1,609 in 621 households as of the 2000 Census. (The city now claims a population of 1,770.) Ellaville is a compact town that grew up around a central highway crossroads. According to City Manager Doug Redmond, it has an employment base of seven manufacturing companies making "everything from powder paints to modular office buildings."

What Ellaville didn't have until recently was broadband access. Neither local telephone company Alltel nor cable operator Mediacom had any interest in providing broadband there, according to Redmond. As early as 1996, the city had considered putting in its own fiber-based system. Two formal engineering studies came back with price tags ranging from $600,000 to $1 million -- simply beyond the city's means.

Things began to change when the Bank of Ellaville installed a T1 line and a wireless local area network (WLAN). The city government also wanted outside connectivity and considered running a line from the bank's router to nearby City Hall. "Then we started looking at a wireless solution to do that," says Redmond. "Finally we thought, if we can do it between the bank and city hall, why don't we just do it for the whole city?"

And so, on July 8, Ellaville launched epride.net, its own high-speed wireless network and Internet access service. The epride network was built by system integrators Tri-State Broadband and NetStar Communications. The system uses 902 MHz Non-Line-of-Sight (NLOS) networking gear from Toronto-based WaveRider Communications Inc.

Tri-State CEO Carl Peede notes that NLOS was a necessity in the area, not so

much because of terrain considerations as the nature of the foliage. All those pine trees are especially hard to penetrate "We'd already been told of several other installations in Georgia where they attempted to use line of sight 802.11 technologies and it simply didn't work very effectively," he says.

The system uses three antennas on top of the town's water tower, connected to a router in City Hall. The city never did connect to the bank's T1 line (it cost around $1,200 a month). As it turns out, running on power lines about two miles outside of town was the fiber backbone of Georgia Public Web, a non-profit provider set up by more than 30 Georgia city and county governments. The city ended up running its own fiber from City Hall out to meet the GPW backbone and the local network had a gateway to the outside world.

In the first three weeks of operation, Redmond says, epride has signed up 87 customers — 65 residential and 12 business. Although some customers require externally mounted antennas, Redmond says, "We've found only one customer we have not been able to provide service to. He lives down in a gully with a lot of large pine trees, and he lives outside our stated service area, which is roughly two to three miles."

That service area derives mainly from the fact that the speed of WaveRider's technology degrades with distance. The city will let users outside that radius sign up, with the understanding that they may not get the same speeds as users in town. Even so, users outside Ellaville itself are getting speeds well above the dial-up which has previously been their only option. "Our deputy city clerk is about four miles out," says Redmond, "and she's getting speeds around 400 kbps."

The service costs $29.95 a month for residential users and $34.95 for businesses. Financial planning for the system was key since Ellaville is a small town on a budget. Tri- State's Carl Peede says wireless technology allowed them to design the system for a fraction of the earlier, fiber-based estimates. To get some idea of the ballpark, WaveRider offers a NLOS starter kit that includes a base station with 50-subscriber license, and five end-user modems for $6,995.

The total price for epride came out to approximately $200,000. That includes the two-mile fiber run (half buried, half aerial) and even 100 end user modems, which the city will subsidize for the first 100 customers. "These cost close to $600, and that's an inhibiting factor of the type of system we have," said Peede. But for the city, "the tradeoff was they enter into a two-year agreement with the end user when they put the system in."

In fact, WaveRider's system was powerful enough that it allowed Ellaville to forego a secondary 2.4 Ghz 802.11 overlay originally intended to serve business customers in town where the water tower would provide good line of sight coverage. "It turned out we could serve most of the businesses in that area over the NLOS as well so we delayed the installation of the 2.4 system," says Peede. The cable has already been run to the water tank, so installing the overlay should be a fairly simple matter if the town decides it needs it.

"We thought we could have payback in four to five years," says Peede. "The rule of thumb we use is if we can get 200 customers in a two-year period it can become really profitable." That's simply to pay for the infrastructure, Peede notes. "It's profitable operationally from day one."

WaveRider's typical installation uses three CAP Channel Units (CCUs) with licensing for a given number of users. With 50-user licenses for each of its three CCUs, epride can support up to 150 simultaneous users. Should its usage eventually outgrow that, Peede says, it's simple and inexpensive to upgrade the

licensing to a hardware maximum of 300 per CCU or up to 900 simultaneous users.

That should provide more than enough access for a town of Ellaville's size. But the town plans to do its best to fill the network. Redmond says that in addition to serving its residents, Ellaville was very conscious of the potential for broadband access as a selling point for the town as it tries to attract new businesses.

Wholly apart from its use in building a larger tax and employment base for Ellaville though, Peede expects epride will have no trouble hitting subscriber levels that will turn it into an ongoing revenue stream. "There's a great thirst in that area," he says, "because small cities in the rural parts of the state simply don't have an alternative."

>>Doug Redmond, City of Ellaville, 229/937-2207; Carl Peede, Tri-State Broadband, 678/867-6933<<

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Small Cities Serve Their Own

All across America, municipal and county governments are waking up to the hard economic truth of the digital divide—and deciding to do something about it. They fear that if they do nothing, their communities will be left behind.

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Usage, Expectations & Strategies for the Future

by Gerry Blackwell
[June 25, 2002]

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The hard truth is that major cable and telephone companies see no profit in small population centers, even small cities, and have no plans to invest in connecting rural and even some suburban areas to broadband Internet access.

In some places, entrepreneurial firms—many using low-cost license-free fixed wireless technology—are bridging the gap. Prairie iNet of West Des Moines IA is one example. There are others.

But in many places, especially the smallest communities, and especially in rural areas, even shoe-string entrepreneurs are absent. The only Internet access is dial-up. This dearth of broadband is beginning to have a negative economic impact.

Cities like Buffalo, Minn. and Columbus, Md. are taking the initiative and building broadband fixed wireless networks that they will use to offer services directly to residents and businesses on a commercial basis, or indirectly through local ISPs.

We'll take a closer look at Buffalo and Columbus later in this multi-part series on municipal WISPs.

Smaller towns, bigger voices
John McDade, president and CEO of Knoxville TN-based WISP and RF network integrator NetStar Communications Inc. says the reasons small cities are acting now are obvious.

"There are probably no broadband services in their area," McDade says. "Or it's very poorly done or very expensive or both. So they're doing this to provide broadband access to their constituents."

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"Or they're doing it for economic development reasons. They want to attract and retain any business that needs Internet access, and so many do now."

September 11, the ensuing economic downturn and other macro trends may also be factors, McDade says. He can't support it with statistics, but he believes people are moving back to small towns.

Small towns are safer and cheaper. Many companies are decentralizing or "virtual-izing"—encouraging, or at least allowing, work-from-home arrangements. The result is that cities are no longer the job meccas they once were.

"And these people [moving back to small towns] like to have their conveniences," McDade says. "Broadband Internet is just one. Cable TV is another."

City leaders in many of these communities are beginning to hear complaints from their constituents about the lack of big-city services, he notes.

While entrepreneurial WISPs may emerge in some even quite small communities, McDade says, funding is generally not readily available to entrepreneurs in the current economic and capital climate. Municipalities, on the other hand, can often tap into federal and state funds as well as their own tax base.

"They have more choices for sources of funds to pay for the system than self-financed entrepreneurial firms do," McDade says. "And it seems they are making decisions faster."

NetStar stumbled on the emerging demand for municipally-funded fixed wireless networks earlier this year and has quickly developed it into a thriving new business. The company also works with new commercial WISPs, and offers regional backbone and retail high-speed fixed wireless services in Knoxville.

NetStar has already sold fixed wireless products and services to over 30 municipalities. It expects to have 15 up and running by the end of this year and 300 within the next three years.

Small communities, real opportunities
The primary target market is small communities of 10,000 inhabitants or less. NetStar is focusing for now on the Southeast where demand may be higher, McDade says, because the region is so much further behind economically.

NetStar has aspirations to eventually go national. McDade believes municipal WISPs may represent a $500-million opportunity for systems integrators.

The first of the NetStar municipalities to actually launch commercial service—sometime in the next few weeks—will be tiny Ellaville, Ga.

Ellaville is fairly typical of the market, McDade says. It has a population of about 2,000 and it's far from major urban centers in the rural heart of the state.

The town contracted with NetStar to provision a fixed wireless network that would provide 100-percent coverage. Ellaville is small enough that this could be done with one tower site, but that may expand in future if demand from outside the town emerges. The whole thing cost about $200,000.

As with many of its municipal customers, NetStar has implemented both 2.4 GHz line of sight technology from Alvarion Inc. and 900 MHz non-line-of-sight technology from Toronto-based WaveRider Communications Inc.

In Ellaville, NetStar implemented three sectors of 900 MHz coverage and one of 2.4 GHz. In some communities, it also uses 5.8 GHz technology or fiber for backbone links. Ellaville has provisioned a single T-1 from a local CLEC to link the wireless infrastructure to the Internet backbone.

The town uses the 900 Mhz WaveRider LMS 4000 network to provide DSL-like service to residential customers. They will pay between $30 and $60 a month for 256-Kbps service that may burst higher. Ellaville will use the more reliable, higher-bandwidth 2.4 GHz radio to provide service to businesses, and charge more.

The town and NetStar have been beta testing for several weeks. Ellaville has already ordered 100 customer systems. Based on initial response, it expects to sell the first 100 subscriptions within the first month. It expects to plateau at the current national average of 10 percent of the population, or about 200 subscriptions.

Next up for NetStar is nearby Fort Valley, Ga., a very similar town—and a very similar network implementation.

McDade worries that talking about the sudden emergence of the municipal WISP market may attract unwanted competition. But at least in his own region, his company clearly already has a long head start.

Besides, we're guessing he wouldn't be able to keep his little secret for long anyway.

Next week: municipal WISPs on a larger scale.

Wireless Internet access system in Buffalo nearly complete

By Ed DuBois

People in Buffalo who have been waiting for high speed Internet access will not have to wait much longer. Tower installation activity behind the House of Lo restaurant and further south in Shonhaugen Park indicate the final phase of establishing a wireless Internet access system is nearly complete.

Work on setting up single-pole towers for wireless antennas has been underway lately. Merton Auger, Buffalo's city administrator, said the installation of towers and antennas will expand the wireless system so it covers the entire corporate limits of the city.

"The expansion should be ready to go by about the end of April," he said.

Customers waiting

Currently 140 customers are being served by the wireless system. Auger said another 150 people are on a waiting list.

"A majority of the city council members do not get it (wireless service) now. That just goes to show you we do not play favorites," Auger joked.

The council members who are not yet getting wireless service are among city residents who currently live outside the area presently being covered by the initial installation of antennas. Lately, more antennas have been installed.

Antenna towers

The single-pole antenna tower installed behind the House of Lo reaches up about 80 feet. Another single-pole tower, which is 100 feet tall, was installed in Shonhaugen Park on the south side of the city. The footings for the towers are 30 feet deep.

Auger said there are seven towers with antennas, altogether. Besides the two single-pole towers, the city's five water towers have wireless Internet antennas on them.

Up and down speed

The wireless system provides 128K "up and down" service. That means customers can download at 128 kilobytes per second and upload at 128K. The best speed of most phone line modems is 56K.
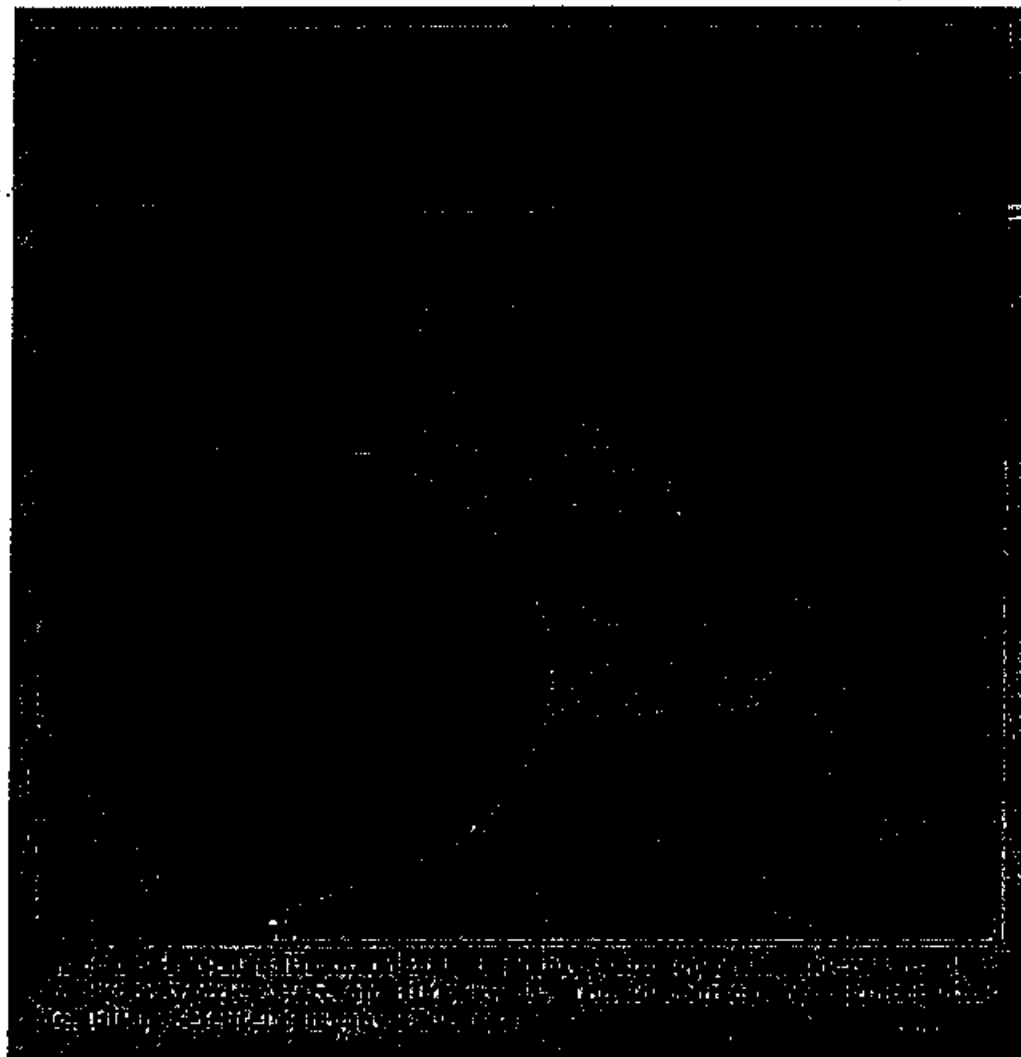
Wireless

Wright County Journal-Press

SECOND SECTION
April 11, 2002/No. 29

Wireless —

Auger mentioned that new software is coming soon for the wireless system. With the new software, the speed will be increased to 256K up and down.

The city is providing the wireless system because high speed Internet access had not been available to most residents of the city from other sources until recently. Telephone companies and cable TV companies have been working on providing high speed Internet access.

The city's fiber optic network provides high speed access to large businesses, as well as for institutions such as the county and the local school system, but the cost of using the fiber optic network is prohibitive for smaller users.

Buy or rent modem

The cost of the wireless system is $29.99 per month for residential customers. The wireless modem can be bought for $400 or rented for an additional $10 per month. Ten e-mail boxes are provided free for each family, Auger said.

Businesses using the wireless system are charged $49.99 per month, plus the cost of the modem (with the buy or rent option). Each business gets 100 e-mail boxes free.

Auger added that businesses needing more bandwidth are charged more for the wireless service. Generally, a business with many computers connected to the system will need more bandwidth.

Testing and adjusting

During the next week or two, some testing and adjusting is following the installation of the towers and antennas.

The wireless system and its new capability of providing service throughout the entire city should be ready to go by the end of the month.

The final phase of establishing a wireless Internet access system in Buffalo is nearly complete.

Chicago Tribune
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There's a time and a place for a home ec

March 18, 2002

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Rosy time for wireless ISPs as scope widens

By Jon Van
Tribune staff reporter
Published March 18, 2002

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These are fortunate times for Internet service providers that use wireless technology to provide high-speed Web access.

Why? Because lately just about everything is breaking their way, said Charles Brown, a vice president at WaveRider Communications Inc.

"The stars are really lining up to smile on the wireless Web providers," said Brown, whose Toronto-based firm supplies wireless infrastructure. "In regulatory issues, technology and marketing, everything is coming together to promote wireless."

A Federal Communications Commission process is under way to double the amount of radio spectrum available for wireless Internet providers to use, said Brown, who delivered a keynote address to a national meeting of wireless Internet providers last week in Naperville.

"That is a huge amount of spectrum," said Brown. "The FCC is trying to create a real competitive opportunity for wireless Internet players."

Wireless Web technology has grown out of technology first designed to make wireless local area networks in offices. As people discovered that the signal could be picked up outside buildings, they started designing equipment made for that application.

The technology at first required a clear line of sight between the sending and receiving antennas and carried only a few miles, but a new generation of equipment has provided ways to send signals greater distances and to make connection without a clear line of sight.

"Getting around line-of-sight is important because it enables the customer to self-install the equipment instead of requiring the service provider to do it," said Brown.

Sales of wireless Web systems are picking up to the point that the volume is driving prices down, Brown said.

"We can show that while it costs a cable TV system operator about $1,300 per home to upgrade his system to supply Internet service, it only costs a wireless operator about $700 per home," said Brown.

The spectrum being used by wireless Internet service providers is unlicensed, but heavily regulated, very similar to the spectrum used by cordless phones, Brown said. Indeed, WaveRider offers a product that uses the same spectrum as cordless phones.

This is in contrast to the spectrum used by mobile phone carriers that paid for their licenses.

"I liken it to a public park versus your back yard," Brown said. "Anybody can use the park, but there are many things you aren't allowed to do. That's similar to unlicensed spectrum. In your own back yard you can do almost anything you want, and you can keep out anyone you want to. That's what licensed spectrum is like."

But even though unlicensed spectrum is completely legal, the operators who pay money for their licenses tend to resent those who don't have to pay.

"They hate our guts," said Brown. "And that represents a regulatory challenge that is always lurking for our industry."

An example of this tension, he said, is the satellite radio industry, which has suggested to the FCC that regulation of signal leakage be tightened up. Such a change in regulation could triple the equipment costs for wireless Web operators, Brown said.

Many wireless Web providers are based in small towns and suburbs that aren't served by digital subscriber line connections from phone companies or cable modem hook-ups. Some municipalities and rural electric cooperatives have launched wireless Web service because that is the only way their residents and businesses can get broadband.